DOCUMENT RESUME

ED 158 674 HE 010 387

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TITLE Effect of Selection Ratio on Correlations Between Admissions Criteria and Measures of Dental Student Success.
PUB DATE 14 Mar 78
NOTE 23p.; Paper presented at the AADS Annual Meeting (Washington, D.C., March 14, 1978); Some illustrations may not reproduce well

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Admission Criteria; *Competitive Selection; Correlation; *Dental Schools; Dentistry; Failure Factors; Higher Education; Measurement Instruments; Predictive Measurement; *Predictive Validity; *Predictor Variables; Professional Education; *Success Factors

ABSTRACT

Correlations between popular admissions indicies, including Dental Admission Test scores and pre-dental grade point average, and numerous measures of student success, such as National Board scores and grades, were compared for recently-graduated students from two dental schools with substantially different selection ratios. While the differences in retrospective predictive validity coefficients for some measures of success were in the direction most would predict (higher for the school with a greater-than-40-percent selection ratio than for the school with a less-than-10-percent selection ratio), the magnitude of the differences was not nearly as large as might be inferred from the most frequently published Taylor-Russell Tables, which assume either a .50 or .60 base rate (proportion of applicants who would be successful if the predictor in question were not used in the selection process). In view of the very low academic attrition in almost all dental schools and the fact that failure is defined as more than two standard deviations below the raw score mean on the norm-referenced National Board examinations, the more appropriate references to consult in estimating changes in predictive ability of admissions indicies as a function of relative applicant pool size are those seldom-published tables with a base rate of .80 or .90. One major implication of this study is that selection ratio does not affect the predictive validity of the most common dental school admissions measures as much as is gathered from reading the more popular texts on psychological testing. (Author/LBH)

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EFFECT OF SELECTION RATIO ON CORRELATIONS BETWEEN ADMISSIONS CRITERIA AND MEASURES OF DENTAL STUDENT SUCCESS

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Educational Research Presentation
AADS Annual Meeting
Washington D.C.
March 14, 1978

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Abstract

It is assumed widely that schools with a favorable selection ratio (proportion of total applicant pool accepted) experience lower correlations between admissions criteria and measures of student success than less selective schools. This is based upon the fact that if a school admits only a small percentage of all applicants, and it selects candidates for admission on the basis of particular quantitative indicies, there will be too little variability within each of these measures among successful candidates to statistically allow for high predictive validity coefficients. It generally is assumed that the true selection value of these indicies is much higher than their emprical predictive validity: that the latter is spuriously suppressed via selection induced loss of variance.

In this study correlations between popular admissions indicies, including DAT scores and predental GPA, and numerous measures of student success, such as National Board scores and grades, were compared for recently graduated students from two dental schools with substantially different selection ratios. While the differences in retrospective predictive validity coefficients for some measures of success were in the direction most would predict (higher for the school with a greater than 40% selection ratio than for the school with a less than 10% selection ratio), the magnitude of the differences was not nearly so large as one might (erroneously) infer from the most frequently published Taylor-Russell Tables, which assume either a .50 or .60 base rate (proportion of applicants who would be successful if the predictor in question were not used in the selection process.)

In view of the very low academic attrition in almost all dental schools (even in schools with unfavorable selection ratios and/or below average entering students), and the fact that failure is defined as more than two standard deviations below the raw score mean on the norm referenced National Board examinations, the more appropriate references to consult in estimating changes in predictive validity of admissions indicies as a function of relative applicant pool size are those seldom published tables with a base rate of .80 or .90.

One major implication of this study is that selection ratio does not affect the predictive validity of the most common dental school admissions measures as much as one might gather from reading the more popular texts on psychological testing. It also may be true that the selection value of these indicies is not much greater than the relatively low predictive validity coefficients reported by schools with very favorable selection ratios.

EFFECT OF SELECTION RATIO ON CORRELATIONS BETWEEN ADMISSIONS CRITERIA AND MEASURES OF DENTAL STUDENT SUCCESS

All schools of dentistry in the United States require applicants for admission to the dental curriculum to submit their Dental Admission Testing (DAT) Program scores and their undergraduate grade point average (GPA). While other factors are always involved in making the final student selection decisions, these two major categories of data typically weigh quite heavily in determining which students will be admitted to dental school and which will be rejected.

There have been innumerable studies conducted by schools of dentistry and the ADA Division of Educational Measurements to determine the extent to which DATs and GPAs predict such indicies of dental student success as grades, National Board scores and licensing examination results. These studies most often have taken the form of predictive validity calculations. Typically the Pearson Product-Moment Correlation Coefficient (r) or one of several multiple correlation coefficients (R) are employed, although more complex statistical tools are used occasionally to deal with this multiple predictor/multiple criteria situation. The great majority of these investigations have found rather low positive coefficients of predictive validity.

Although each study reports a different set of correlation coefficients between admissions predictors and measures of dental student success, there are many substantial similarities reported in the literature. Among these are: 1) Prediction is best for basic science didactic grades and Part I National Board scores, next best for clinical didactic grades and Part II National Board scores, quite low for preclinical technic laboratory grades, and so poor as to be essentially useless in the case

of clinical grades and licensing exam scores; 2) Individual predictive validity coefficients generally range from approximately .50 re success measures best predicted to near .00 re success measures in clinical dentistry; 3) Multiple correlation coefficients generally range from approximately .60 to near .00 as the success measures are arrayed from "book learning" to clinical practice; 4) The most frequently employed predictors are much more useful in identifying students who will likely fail than for predicting individual levels of student success; 5) The best single predictors seem to be the DAT scores entitled Academic Average, Reading Comprehension and Total Science and the undergraduate Science Grade Point Average (SGPA); 6) The DAT Perceptual Motor Ability Test (PMAT) predicts as well as the old DAT Chalk Carving Examination, and has demonstrated a significant, though not powerful, ability to predict preclinical technic laboratory grades; 7) There are many other measureable variables which are positively correlated with dental student success, but their predictive validity coefficients drop drastically when the effects of the previously cited predictors are partialed out statistically, thus they add very little to creation of combined predictor scores; and 8) Good predictors of success in clinical dentistry are still nonexistant.

In view of the data from the hundreds of validity studies summarized above, some have argued that schools of dentistry should give little weight to DATs and GPAs in making student admission decisions. They correctly make the point that one must square a correlation coefficient in order to determine the proportion of variance in the success measure which may be "attributed" to the predictor. Thus even an r of .40 between DAT Total Science scores and biochemistry grades "accounts" for only 16% of the variance in these grades. A very respectable multiple R of .60 between optimally combined predictors and average basic science grades leaves almost two thirds of the variance in these grades "unpredicted."

It also has been noted that multiple correlation coefficients capitalize on chance errors within the sample used to compute the coefficients and are always spuriously high in terms of the ability of the resulting component score weights to predict performance in another sample (class) of students. This is especially true if more than two or three individual predictors are combined in a multiple R for the sample sizes present in most dental schools. Indeed one should have a sample of at least 250 students before even four predictors are combined in a multiple R calculation. There are formulas for predicting this "validity shrinkage," but empirical cross validation is the better approach.

Since even regression equations based upon simple correlations between one predictor and one success measure capitalize on chance errors in the sample on which one no longer needs to predict success, even the best predictors of dental student success are not as valuable in the actual selection of students as their rather mediocre coefficients indicate. Unfortunately it is extremely rare for a school to cross validiate its favorite predictors. When one considers the factors mentioned above, as well as the phenomenon of regression to the mean in prediction situations and the usually erroneous assumptions of normality,[1] linearity, homoscedasticity, etc., it is clear that if an admissions committee were to calculate predictive validity coefficients on one class of dental students and then use these data to predict individual performance of students in the next entering class, they would be very disappointed to learn that their predictions would be even less accurate than they had feared, based upon the coefficients previously computed.

In view of the preceeding discussion, it would appear that the arguments against paying much attention the DATs and GPAs in the selection of

(1) National Board examinations, for example, are constructed so as to yield a negatively skewed distribution; and dental school grade distributions are seldom normally distributed.

dental students would prevail. There are, however, many counter arguments to be made. Two of the most persuasive are the related notions of selection induced restriction of variance in the predictor scores and the effects of selection ratio on the actual selection value of predictors with only moderate validity coefficients. A review of the literature, however, indicates that these two counter arguments are based upon assumptions frequently cited in texts of psychological testing, but yet to be empirically tested in schools of dentistry. The study described below constitutes a partial and indirect test of these assumptions.

The spurious suppresion of predictive validity coefficients by a favorable selection ratio (proportion of total applicant pool actually admitted) may be explained by a simple example. Suppose that 1500 applicants to a dental school are tested in the DAT program and 150 are randomly selected and enrolled in the dental curriculum. It subsequently may be determined that the correlation between the DAT Academic Average scores (predictor) and average grades in didactic courses (success measure) is .70. This is graphically illustrated in Figure 1.

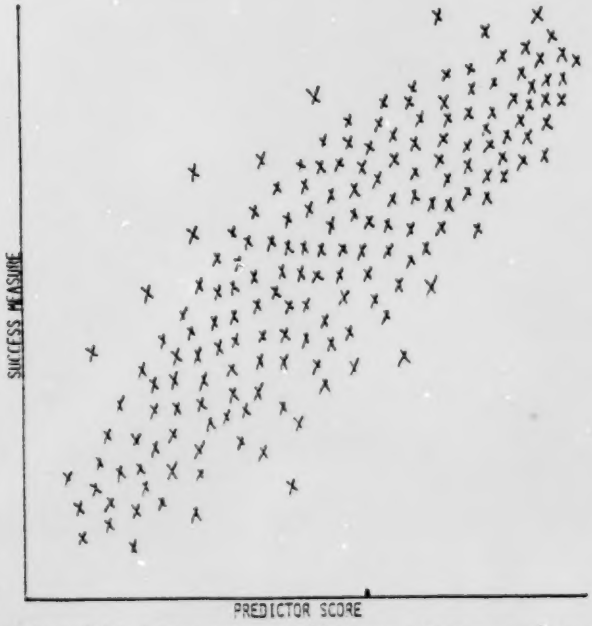

Figure 1. Relationship between predictor scores and success measures in applicant pool, where there is a high positive predictive validity coefficient.

Most admissions committees, however, believe that DAT Academic Average scores do possess some ability to predict didactic grades. Suppose the committee in this hypothetical case enrolled the 150 students with the highest DAT Academic Average scores, rather than randomly selecting from the 1500 applicants. The resulting predictive validity coefficient between this predictor and this measure of success would of necessity be calculated on the upper 10% of the distribution displayed in Figure 1. This very different situation is graphically displayed in Figure 2.

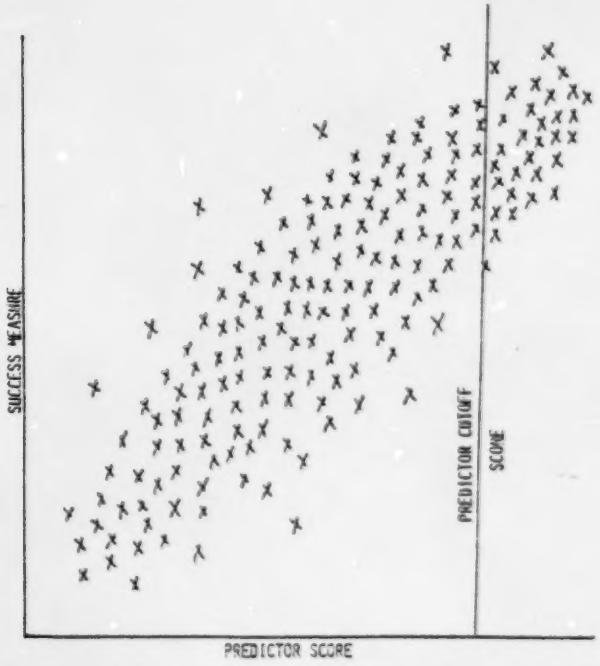

Figure 2. Relationship between predictor scores and success measures when a favorable selection ratio yields a high predictor cutoff score.

It is clear that the predictive validity coefficient calculated in the second case would be substantially lower than in the case of random selection. Texts in psychological testing present several methods for estimating the influence of selection ratio on student success at various levels of predictive validity. The most popular of these are the Taylor-Russell tables.

If the most frequently published Taylor-Russell Table were consulted in the case of a school selecting the top 10% on a test with .70 predictive validity, one would expect 97% of the students to be successful on the criterion measure. Many dental schools actually use these tables "in reverse." If it is found that 97% of their enrolled students (selected on the basis of a predictor score) are indeed successful on a success measure, they infer that the true correlation between this predictor and success measure must be approximately .70 in the total applicant pool. It is assumed that the much lower predictive validity coefficients actually computed on the samples (classes) of students enrolled on the basis of these predictor scores is a result of the phenomenon depicted in Figure 2. The same Taylor-Russell Table is cited to argue that even if qualitative characteristics of the applicant pool were to remain unchanged but a drop in the number of applicants were to force a 40% selection ratio, the percentage of successful students would fall from 97% to 87%.

There are several assumptions implicit in the use of the Taylor-Russell Tables which are yet untested in dental schools. One of these is the determination of the actual base rate (proportion of applicants who would be successful if the predictor in question were not used in the selection process) extant in dental school applicant pools. In the specific example of Taylor-Russell usage described above, the most frequently published table was consulted. This table, however, assumes a base rate of 60%. There is substantial reason to believe that in no instance would 40% of all dental students fail, if a random selection of applicants were to be enrolled in a dental curriculum.

Even schools committed to criterion referenced master grading implicitly set the level for failing grades in relation to the previously observed levels of student achievement. The National Board examinations

are clearly norm referenced and only students scoring below two standard deviations below the national raw score mean are classified as failures. It is clear, therefore, that if one wishes to estimate the influence of selection ratio on accurate predictions of student success, the very seldom referenced table with a base rate assumption of at least .80 should be consulted. In view of the fact that the national selection ratio for admission of dental students has recently risen from approximately 30% to near 50%, and still academic attrition is only about 3%, it would appear that the Taylor-Russell Table with an assumed base rate of .90 may be most appropriate.

In addition to the arguments cited above, there are many other informally shared but yet undocumented observations which suggest that the .90 base rate table should be used in estimating the true selection value of the most frequently used predictors. Among these are: 1) Substantial qualitative differences in school applicant pools do not usually produce expected differences on measures of student success; 2) Substantial differences in school selection ratios do not result in expected differences on measures of success; 3) Changes in quality and/or quantity of applicants to a particular school do not produce expected changes in student success; and 4) Few, if any, schools do in fact select students solely on the basis of validiated predictors. This latter phenomenon is quite important, because it means that schools with a selection ratio of 10% do not select students from the top 10% on any predictor score. They more frequently select their 10% from among the top 30-40% of the applicant pool. The restriction of range in predictor variance, therefore, is not nearly so extreme as usually assumed; and it is surely not the situation shown in Figure 2.

The important implication of shifting from a .60 base rate table to a .90 base rate table is that one would expect no meaningful difference in student success between a selection ratio of 10% and 40%. It also follows that the estimate of true predictive validity for a predictor score in an applicant pool would be quite close to the validity coefficient actually calculated on enrolled students, if the true base rate is .90 rather than .60.

Another untested assumption in the use of the Taylor-Russell Tables is that a linear relationship exists between the predictor scores and success measures in the applicant pool. This is the assumption underlying Figures 1, and 2. In studies of predicting levels of success in fields other than dentistry, it is not uncommon to find a curvilinear relationship. One of the most frequently discovered situations is that shown in Figure 3.

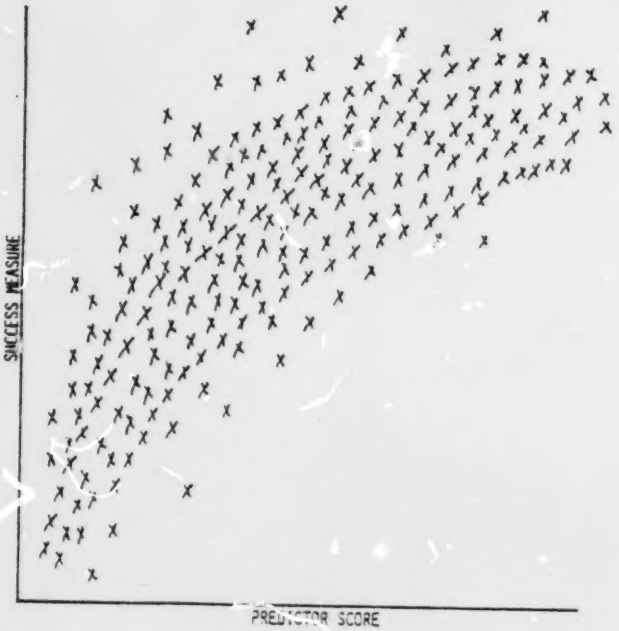

Figure 3. Possible curvilinear relationship between predictor scores and success measures in national applicant pool.

When the cirvilinear relationship in Figure 3 is present in a particular school's applicant pool, one should expect no meaningful change in student performance if this school must shift from a 10% to a 40% selection ratio. If this were the particular curvilinear nature of the national applicant pool, a school with a below average applicant pool would not necessarily experience substantially more National Board failures unless it were forced to select a number of students from near the bottom of the national pool (where a strong positive linear relationship does exist in this hypothetical example). As indicated above, the implicit norm referencing of individual school grades would protect a school from high internal failure rates even if it enrolled students from the very bottom of the national applicant pool.

Beyond actual failures, dental schools are also concerned about levels of student success. The Taylor-Russell Tables speak only to the rate of a priori defined failure. The arguments referenced above to Figures 1, 2 and 3 are also related to predicted levels of success. There are also tables in psychological testing texts which are designed to relate selection ratios and predictive validity coefficients to varing levels of performance. Frequently cited are the Tables of Naylor and Shine

If a school enrolled the top 10% of applicants on a predictor test with a .70 validity coefficient (for the total applicant pool), the Naylor and Shine Tables indicate that the enrolled students should perform almost twice as well on the success criterion as compared to the situation which would exist if the selection ratio were 40% (assuming no qualitative change in the applicant pool). These tables, however, also assume a linear relationship between predictor scores and success measures in the applicant pool, and require that one enter the tables with a known (or accurately estimated) predictive validity coefficient for the applicant pool. If one

makes the linearity assumption, the true predictive validity coefficient may be estimated (via the Naylor and Shine Tables) if one compares the change in average level of success in a school with a changing selection ratio, but unchanging applicant pool predictor score distribution. One might also come by this estimate of true predictive validity coefficient by comparing average levels of student success between two schools with different selection ratios, but similar applicant pool predictor score distributions. As indicated previously, the best success criteria would be National Board scores, because grades tend to be at least implicitly locally norm referenced. If is also true that since most dental schools have converted from numerical (or percentage) grades to letter grades, the variance in school grades is usually so low as to make most unlikely high predictive validity coefficients---even if random selection of the applicant pool were to be employed.

METHOD

The study reported here is part of a more comprehensive investigation of dental school admissions in the United States. In this subset of the larger study, the relative performance of popular student admissions predictors was compared at two very different schools of dentistry.

One school is a private institution with no residency requirements for admissions and a very favorable selection ratio. At the time of the study this school averaged more than 3,000 qualified applicants per year, of which it needed to accept fewer than 10% in order to fill a class of 160. This school will be identified subsequently as "S/R<10" (its selection ratio). The other school is a state institution operating under a requirement that at least 90% of all enrolled students be state residents. At the time of the study, this school had to accept almost half of its

qualified applicants in order to fill a class of 88. This school will be identified subsequently as "S/R>.40" (its selection ratio.)

At each school both recently graduated dentists and currently enrolled dental students were used to compute thousands of product-moment correlation coefficients between potential predictors and measures of dental student success. Multiple correlation coefficients were computed and scatter-diagrams were plotted for both types of correlations. Both types of coefficients were used to generate regression equations which were employed in cross validation checks. The multiple regression equation developed at S/R<.10 also was used to predict student grades and National Board scores for S/R>.40 students. Means and standard deviations were determined for both predictors and success measures. Standard errors of estimate were calculated for the regression predictions within the original samples and in the cross validation studies. At each school students who failed one or more required courses or one or more of the National Board tests were identified for further analysis of admission indicies.

RESULTS

With such a massive data pool, it is impossible to present completely even the results of this subset of the total study. Fortunately, the data from each school were so consistent that it is possible to present accurate summaries of the comparative findings.

The principal substantial <u>difference</u> between the two schools (other than selection ratio) was that of predictor score averages found in the dental students enrolled at S/R<.10 and S/R>.40. At the former institution, the median DAT score for each class analysed was "6" in the majority of analyses (with a median standard deviation of 1.5) and the predental science GPA was consistently above 3.0. At the S/R>.40 school, the median DAT score was "4" for most of the study data (with a median standard deviation of 1.6) and the

predental SGPA was below 3.0 for the classes examined. Although the variance in DATs and GPAs was quite similar in both schools, across the three classes studied, the restriction of range phenomenon was not nearly so severe as the selection ratios would indicate. Since students, in fact, were not choosen solely on the basis of predictor scores, predictor score variability was sufficient for high predictive validity to occur. The range was somewhat larger in the S/R>.40 school. This is shown in Figure 4.

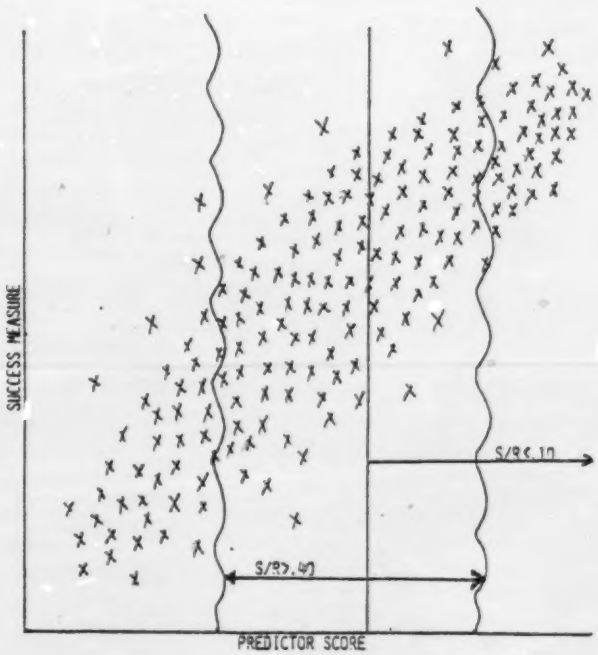

*Figure 4. Effective range of predictor scores in two schools with selection ratios of <10% and >40% respectively, when applicants come from different parts of the national applicant pool.

Most of the S/R<.10 students were graduates of colleges rated "Most Selective" or "Very Selective" by the Barron's Profiles of American Colleges, while most S/R>.40 students had taken their predental training at colleges rated "Selective" or "Least Selective."

Grade distributions at the two schools were very similar. National Board performance was also essentially the same, with class averages at each

school near the national mean in the great majority of comparisons made. Proportion of failures on the National Boards, and academic attrition were slightly higher at S/R>.40, but so low as to yield little meaningful data. In both schools, failing students did present average predictor scores below both the national and local means, but this was not true in all individual cases.

The best predictors in both schools were the DAT Academic Average, DAT Reading Comprehension, DAT Total Science and undergraduate science GPA. The predictive validity coefficients were generally a bit higher at S/R>.40, but not so sufficiently (or consistently) different as to be meaningful. Several representative examples are present in Table 1.

The correlations between the best predictors and various dental student grades were very similar. At both schools, these coefficients generally clustered around .30 for didactic grades and near .00 for clinical grades. The PMAT 3D scores, however, did demonstrate some ability to predict grades in some preclinical technic and clinical courses. These coefficients clustered around .20, with a number of them being in the vicinity of .30. There were few differences between the two schools, yet in both schools the PMAT 3D was clearly superior to the PMAT 2D or PMAT Average, in terms of predictive validity.

Multiple correlation coefficients, combining the best predictors, tended to cluster around .50 for didactic grades and National Board scores, and around .30 for technic and clinical grades, as well as licensing exam scores. On cross validation, however, these median multiple correlation coefficients fell to about .40 for didactic grades and National Board scores and ranged from .20 to near .00 for technic and clinical grades, as well as licensing examinations. There were no substantial differences between the two schools in this regard.

Table 1. Sample predictive validity coefficients for two schools with different selection ratios (S/R).

		Schools	
Predictor	Criterion	S/R>.40	S/R<.10
DAT Academic Average	Nat.Bd. Part I	.45	.37
DAT Academic Average	Nat.Bd. Part II	.42	.41
DAT Reading Comprehension	Nat.Bd. Part I	.26	.27
DAT Reading Comprehension	Nat.Bd. Part II	.26	.40
DAT Total Science	Nat.Bd. Part I	.54	.44
DAT Total Science	Nat.Bd. Part II	.49	.41
U/Grad Science GPA	Nat.Bd. Part I	.28	.23
U/Grad Science GPA	Nat.Bd. Part II	.07	.06

When the multiple regression formula generated from S/R<.10 data was used to compute a single predictor score for students at the S/R>.40 school, two differences were observed as compared to the cross validation studies using the same formula at the S/R<.10 school: 1) The S/R<.10 combined predictor score correlated somewhat better with didactic grades and National Board scores at the S/R>.40 school than in cross validation studies at the school of its orgin; and 2) The multiple regression equation generated at the S/R<.10 school very consistently underestimated didactic grades and National Board scores at the S/R>.40 school. In both schools, the standard errors of estimate were so large as to make essentially worthless the prediction of individual student success measures; except that when the S/R<.10 equation was used to predict individual student didactic grades and National Board scores at the S/R>.40 school, one very reliably could estimate that S/R>.40 student performance on the success measures would be substantially higher than predicted by the S/R<.10 equation.

DISCUSSION

The data collected at two dental schools with very different selection rations show predictive validity coefficients quite similar to each other and quite similar to those computed at other dental schools and at the national level. These similarities hold with respect to: 1) Identification of best predictors; 2) Magnitude and direction of particular coefficients; 3) Success measures best predicted; 4) Success measures not well predicted; 5) Multiple correlation coefficients and their cross validation shrinkage; 6) Inability of resulting regression equations to accurately predict individual student performance (except for students with very low predictor scores); and 7) Predictor variance sufficiently high to allow of much higher validity coefficients than those observed.

The most noteworthy finding in this study was that although the students in one school were characterized by predictor scores clearly below the national average, they performed as well on the usual success measures---including the nationally norm referenced National Board examinations---as students in a school where the student body was clearly above the national average on the same predictor scores. In view of these data it is not surprising that the multiple regression equation generated from correlation coefficients in the S/R<.10 school very consistently underestimated individual student success in the S/R>.40 school.

The ADA Division of Educational Measurements has reported that the median DAT scores for enrolled dental students is 5, while the national mean for applicants is always set at 4 for each of the DAT tests. It is from this information that one determines that the students enrolled in the school with a selection ratio of less than 10% were, on the average, one standard deviation above the national applicant pool, whereas the students enrolled in the school with a selection ratio of greater than 40% were, on the average, from the middle of the national pool of dental applicants.

Although there was a substantial difference in selection ratios, the suppresion of predictor score variance assumption was not apparent when predictor score variability was compared in the two schools. Technically there was less "restriction of range"in S/R>.40 predictor scores, but the computed standard deviations around the quite different means indicated that most of the S/R<.10 students came from those applicants with DATs in the range of 4 to 8, and most of the S/R>.40 students came from applicants with DATs in the 2 to 6 range.

Although the DAT variances at the two schools were equal, the percentile bands in the national applicant pool tapped by each school are quite

different. Almost all S/R<.10 students came from the top 50% of the national applicant pool, with most of them coming from the top two thirds of the pool. The S/R>.40 students, by contrast, came from the middle two thirds of the national pool. In both instances, the DAT standard deviations (1.5 compared to 2.0 in the national pool) and DAT effective range (6 DAT score points) were high enough to make most suspect the argument that DAT predictive validity coefficients are greatly surpressed via the selection induced restriction in range phenomenon. (See Figure 4.)

The similarity of predictive validity coefficients in the two schools suggests that if there is a curvilinear relationship between predictors and success in the national applicant pool, the slope of the regression line does not become noteably linear and steep until one drops at least below DATs of 3. (see Figure 3.)

The fact that the S/R<.10 multiple regression equation so consistently underestimated S/R>.40 National Board performance is more difficult to explain. It may be that there is a low positive relationship between DATs and National Board performance along the range of DATs from 3 to 9, but students in a school with median DATs of 4 may compensate for their comparative disadvantage vis a vis students at a school with median DATs of 6 via better preparation, motivation, etc. It is also possible that less selective schools give more attention to preparing their students for these national examinations.

CONCLUSIONS

While this study has not unambiguously established the fallacy of assuming that the quite mediocre predictive validity coefficients observed by dental schools with very favorable selection ratios are spuriously suppressed by virture of selection induced loss of variance, it does appear

that such a school would not necessarily risk reduced student performance on the usual success measures if they paid less attention to the usual predictor scores. To the extent that one may generalize from this comparative study, it may be concluded that students with below average DATs and modest GPAs from average undergraduate colleges have about as good a chance for dental school success as students with sutstantially above average predictor scores; although some compensatory preparation for National Boards may be necessary.

Perhaps the most important conclusion of this study is that it appears safe for dental schools to experiment with predictors which may have some ability to select students who will be more successful in clinical dentistry---the area where currently popular predictors fail in all schools. There are some data in this study, and from ADA reports, that suggest it would be risky to ignor DATs and GPAs altogether. On the other hand, one would find if difficult to point to data which clearly support the notion of giving substantial weight to either DATs or GPAs above a rather low minimum requirement.

There is little in the professional literature or findings from this study which would argue against a dental school using multiple cutoff predictor score criteria to qualify a large pool of applicants which could then be used to test potential predictors of success in clinical dentistry. Even placing the cutoff for DATs at the level of 3 appears to engender little risk of student failure.

Surely there is no good justification for mechanically selecting dental school applicants presenting the highest DATs and GPAs. Beyond some rather low minimum, these "predictors" predict neither likelyhood of failure nor individual levels of student success sufficiently well to avoid

experimentation with admissions indicies which may predict success in the profession for which matriculated students are ostensively being prepared. This study, imperfect as it may be, brings into serious question the common assumption that the selection value of DATs and undergraduate GPA are much better than their quite modest predictive validity coefficients indicate. It appears that these coefficients are not spuriously suppressed via selection induced loss of variance; instead, they seem to rather accurately reflect the true selection value of these predictors accross all except the bottom one fourth of the national applicant pool.